DOCUMENT RESUME

ED 339 332 HE 025 117

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TITLE A Study of Research and Teaching Orientations in Twenty-Seven Academic Departments: The Impact on Undergraduates. ASHE Annual Meeting Paper.
PUB DATE Nov 91
NOTE 28p.; Paper presented at the Annual Meeting of the Association for the Study of Higher Education (Boston, MA, October 31-November 3, 1991).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143) -- Information Analyses (070)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Classroom Environment; College Environment; *College Students; *Departments; Educational Environment; Higher Education; *Individual Development; Learning Experience; Organizational Climate; *Outcomes of Education; *Reinforcement; Research Universities; Student Development; Teacher Student Relationship; *Undergraduate Study
IDENTIFIERS *ASHE Annual Meeting

ABSTRACT

This study analyzed a variety of departmental and student outcomes data obtained from faculty and graduating seniors in 27 academic departments at a Research II University. The purpose was to answer two questions: (1) does a strong research orientation by an academic department promote or hinder student learning and growth? and (2) are differences in departmental teaching and research climates associated with differences in the academic integration and intellectual growth of the undergraduates who major in those academic disciplines? Study findings confirmed the notion that different academic departments would have variable research and teaching climates, and that there were direct relationships between department climate and student academic integration. The results also found that a vigorous research orientation by an academic department, particularly when combined with attention to teaching responsibilities, has a beneficial influence on the academic integration and intellectual growth of undergraduate majors. However, what appeared to affect student learning, development, and satisfaction the most were the vitality of the classroom experience, the student-faculty relationships outside the classroom, and the strength of student friendships. Contains a 46-item bibliography. (GLR)

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A STUDY OF RESEARCH AND TEACHING ORIENTATIONS IN TWENTY-SEVEN ACADEMIC DEPARTMENTS: THE IMPACT ON UNDERGRADUATES

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HE 025 117

Paper presented at the 1991 Annual Meeting of the Association for the Study of Higher Education, Boston, Massachusetts, November 1991. The authors are deeply indebted to the earlier data collection and research efforts at Albany by Patrick Terenzini and Thomas Wright. We also are grateful to Marios Agrotes, Assistant for Institutional Research at Albany, for constructing the database used in our analysis.

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ASSOCIATION FOR THE STUDY OF HIGHER EDUCATION

This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Park Plaza Hotel & Towers in Boston, Massachusetts, October 31-November 3, 1991. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

A STUDY OF RESEARCH AND TEACHING ORIENTATIONS IN TWENTY-SEVEN ACADEMIC DEPARTMENTS: THE IMPACT ON UNDERGRADUATES

ABSTRACT

Does a strong research orientation by an academic department promote or hinder student learning and growth? Are differences in departmental teaching and research climates associated with differences in the academic integration and intellectual growth of the undergraduates who major in those academic disciplines? This study examines these questions by analyzing a variety of departmental and student outcomes data obtained from faculty and graduating seniors in 27 academic departments at a Research II University.

INTRODUCTION AND PROBLEM STATEMENT

A major challenge for research universities is achieving the proper balance between the discovery of knowledge and the transmission of knowledge. The faculty's institutional role (to provide instruction for students) may compete with the faculty's professional role (to carry out research and scholarship.) Caplow and McGee (1958) were among the first to study the interesting dichotomy created by institutions that hire faculty to teach but give them promotion and salary advancement based primarily on their research and scholarship.

Many authors (Kerr, 1963; Veysey, 1965; Clark, 1987) view faculty research and teaching roles as being in conflict. Clark Kerr (1963) describes the "federal grant university" as one in which the best faculty are diverted from undergraduate education by the lure of research, grantsmanship, and graduate instruction. Sample (1972) argues that research can produce intellectual narrowness and over-specialization. At least three national reports have expressed concerns about the weakened priority of undergraduate instruction in universities: "Involvement in Learning" (1984), "Integrity in the College Curriculum" (1985), and "The Undergraduate Experience in America" (1987). Sykes in his book Profscam, paints an unattractive picture of faculty life—one which ignores the needs of students (1988). Additionally, students, parents, and many legislators and trustees generally expect faculty to be more devoted to teaching students than to research and scholarship. State reviews of faculty teaching workload have been conducted or are underway in at least five states (Cage 1991).

A second view, held by other authors, is that research and teaching are companions, not competitors. These authors argue that learning through research increases faculty knowledge and intellectual vitality (Jencks and Riesman, 1968), that faculty who carryout research and scholarship are more likely to produce desirable student outcomes (Abelson 1967), that teaching fosters a love of knowledge which compells one to conduct research (Teague 1981), that the best faculty scholars and best students both tend to be attracted to research univerities (Blau 1973), that being a productive scholar stimulates faculty interest and enthusiasm (Centra 1983), that scholarly performance is the best test of one's ability to perform in the classroom (Bretton 1979), that faculty who are productive in research are more likely to challenge students by their higher expectations (Michalak and Friedrich 1981), and that research productivity reflects systematic thinking, self-discipline and orderlines which are concomitants of good teaching (Friedrich & Michalak 1983). Faculty and administrators at research universities generally believe that faculty scholarship and discovery of new knowledge shape the special mission of the institution and benefit both students and society as a whole (Jauch 1976).

A third possibility is that research productivity and instructional effectiveness have no relationship to each other. Feldman's (1987) review and synthesis of the literature on research performance and teaching performance lends empirical support to this view. Across 29 studies, he reports that the average correlation between student ratings of instruction and various measures of faculty research productivity is 0.12. He also found little support for the hunch that research production has a differential impact on specific dimensions of instruction. In other words, these studies report a positive but weak relationship between the measures of research and scholarly productivity on the one hand, and various measures of teaching and instruction on the other.

The vast majority of studies rely upon student ratings of instruction as the dependent measure. The published literature contains only a few studies which examine the relationship between faculty research activity and student outcomes as distinct from student ratings (Friedrich and Michalak 1983, Hoyt 1974, Hoyt and Spangler 1976, Rossman 1976). The Studies by Friedrich and

Michalak (1983) and by Rossman (1976) were conducted at relatively small private liberal arts colleges. The Hoyt (1974), Hoyt and Spangler (1976) studies took place at a relatively large public research university and produced somewhat different results than the other two. However, taken as a whole, these studies suggest a weaker relationship between research performance and student growth than between teaching effectiveness and student growth. Thus, the connections, if any, between research climate and undergraduate educational outcomes may be indirect, rather than direct.

Likewise, only a few studies have examined the influence of the academic discipline. Feldman's synthesis of the literature uncovered only five published studies which examine the association between research productivity and teaching effectiveness in different academic disciplines (Braunstein & Benston, 1973; Bresler, 1968; Centra, 1983; Michalak & Friedrich, 1981; and Voecks, 1962). In each case, these studies examine the relationships among broad disciplinary areas (such as humanities, sciences, and social sciences), rather than among individual academic departments. Moreover, some of the findings are contradictory. For example, Michalak and Friedrich (1981) study at Franklin & Marshall found a stronger relationship between research productivity and teaching ratings in the humanities and social sciences than in the sciences. Yet Hoyt and Spangler in their study at Kansas State (1976) found a positive association between research measures and student outcomes in the natural sciences versus a negative relationship in the social sciences. There may be different dynamics in the research and teaching relationship at different types of institutions.

The earlier research, then, generally fails to explore the possibility of differential effects of academic departments <u>within</u> the broad disciplines represented by the humanities, sciences, and social sciences. Previous studies of faculty research activity have not focused upon the academic department as a unit of analysis, nor has there been an investigation of the association between an academic department's research climate and the intellectual growth of its undergraduate majors. Does a strong research orientation by an academic department promote or hinder student learning and growth? Are differences in departmental teaching and research climates associated with differences in the academic integration and intellectual growth of the undergraduates who major in those academic disciplines? The current study addresses these questions by examining departmental and student outcomes data obtained at a public research university.

Conceptual Framework

Rather than linking students ratings to individual faculty, as has been done in the studies reviewed by Feldman in his meta analysis (1987), the current study takes a structural-functional approach. Department research climate is taken to be a sub-environment characteristic influencing both faculty and students within the context of their teaching and learning activities in the major department.

The conceptual framework for this research, then, is derived from three overlapping branches of the higher education literature. First, the debate over the impact of research on teaching has produced a variety of opposing points of view and at least one conceptual model (Friedrich & Michalak, 1983). Second, scholarly interest in the impact of college on students has given rise to a number of theories of student development, and these were recently summarized by Pascarella and Terenzini (1991). After reviewing the evidence from the past two decades of research they conclude that there is now rather widespread conceptual and empirical support for the notions that both classroom experiences and faculty student interactions outside of class are important sources of influence on student growth (Pascarella & Terenzini, 1991). Third, the literature on academic organizations indicates the existence of variable department cultures or climates (Clark, 1963). Baird (1988), Biglan (1973), Chickering (1969), and Kolb (1988) all support the claim that organizational sub-environments within the same institution can produce substantially variable influences on student development. At least two causal models from the outcomes literature provide for the influence of organizational characteristics and the major department (Pascarella 1985, and Weidman 1989).

Ewell (1989) found that overall institutional culture was not significantly associated with student achievement, but a number of outcomes studies have suggested the importance of sub-environments, such as major departments, in the study of college impact on students. Smart's study of student self-esteem found that the academic sub-environments <u>within</u> campuses are more strongly associated with student development than are the general campus environments. Similarly, in their study of campus climate, Moran and Volkwein (1988) found that subunit effects were more significant than

organizational effects. While organizational level climate did distinguish campuses from one another in their study, academic departments accounted for the largest proportion of variance in climate. Pascarella (1976) found different perceptions of the college environment by students majoring in humanities versus social sciences. Hartnett & Centra (1977) found substantial between-department variation in educational effectiveness within the same institution. In his study of undergraduate value orientations and socialization, Weidman (1979) found that the student's major department displayed a significant and substantial influence. "Departmental faculty normative influences on majors tend to outweigh the normative influences of peers..." (p. 60).

Our study examines departmental influences on undergraduate educational outcomes and Figure 1 displays the conceptual model. Student outcomes result from a variety of campus and pre-college influences. While campus resources, student support services, and individual backgrounds all contribute to the academic and social integration of the student, these variables are not the focus of the current investigation. Our study views the academic department as an important component in the undergraduate experience and seeks to measure the relationship between department research climates and the outcomes of students who major in those departments.

METHODS & VARIABLES

For this study, we developed four measures of departmental research climate, four measures of teaching climate, five outcomes variables as dependent measures, and utilized four measures of academic integration and three measures of social integration. The analysis draws upon the outcomes survey responses of a population of graduating seniors in 27 different academic departments at a university classified by the Carnegie Foundation as a Research II institution. The outcomes database consists of the combined responses of 655 randomly selected seniors who entered the institution as freshmen between 1978 and 1982 and who graduated between 1982 and 1986. We also conducted interviews with deans and chairs, and gained access to faculty resumes and multi-year university data on instructional contact hours and research grants.

This research adopts a multi-measure approach, using both judgemental and quantitative information. We attempted to avoid the limitations that would be created by a narrow time span and uni-dimensional measures.

Measures of Departmental Research Climate

1. **Grant Applications:** From university data, we calculated the grant applications per faculty member for each academic department over an 8 year period (1978-86). We used this as a measure of faculty effort to obtain external support for research and scholarship.
2. **Grants Received:** We calculated the average number of grants received per full-time faculty member for each academic department over an 8 year period (1978-86). We used this as a measure of faculty effectiveness in obtaining external support.We used the number of grants rather than dollar amounts to avoid skewing the measure toward the natural sciences.
3. **Deans Rating:** The Dean of each college rated (High-Medium-Low) the climate for research and scholarship in each department in that college between 1978 and 1986. All of the deans were present for at least the last six of the eight years, and two held the office for the entire period.
4. **Percent of Active Scholars:** A panel of four university people agreed on discipline-specific standards reflecting scholarly productivity. Three of them reviewed the curriculum vitae of each full time faculty member in 27 departments, and made judgements about the number and percent of active scholars in each academic department. The four panelists included the University's Director of Program Review, the Director of Institutional Research, a graduate student researcher, and a senior faculty member of the University's Promotion and Tenure Council who is a former Vice President for Research & Graduate Studies. The reviewers made independent judgements about the curriculum vitae for each faculty member in each department and then met together to reconcile differences which amounted to less than one case in ten. Each curriculum vitae was examined for publications of books, book chapters, journal articles, monographs, book reviews, technical reports and essays, conference presentations, invited addresses and panel discussions, exhibits and performances, contracts, grants and patents, as well as editorial and professional leadership roles. In making judgements about the number of active scholars in each department, the reviewers took into account the age and years of service of each faculty member. In addition, journal articles and books were given more weight if they involved sole authorship or were published by a leading press or referreed journal in that discipline.

When trichotomized (high-medium-low), these four research variables formed a scale with a reliability (ALPHA) of .90, indicating a high degree of congruence among the two judgemental and the two quantitative measures.

Measures of Department Instructional Climate

1. **Dean's Rating:** The Dean of each college rated (High-Medium-Low) the undergraduate teaching climate in each department in that college over the eight year period covered by the study (1978-86).
2. **Student Ratings:** Graduating seniors rated faculty interest in teaching on a scale from one to five. Individual ratings were aggregated to form departmental averages.
3. **Faculty undergraduate instructional contact hours:** Each fall semester, the university calculates the number of hours each faculty member is in official interaction with students in all types of instruction. Departmental averages for undergraduate level instruction over the eight years were calculated from the university's course and section analysis.
4. **Faculty/student academic contact:** Graduating seniors reported the number of out-of-class faculty contacts of at least ten minutes to discuss academic matters. Individual frequencies were aggregated to form departmental averages.

When trichotomized (high-medium-low), these four teaching measures formed a scale with a reliability (ALPHA) of .57, indicating only a modest degree of congruence among this mixture of judgemental and quantitative measures.

Measures of Academic Integration

Several earlier studies have established the importance of student academic integration as a condition which is strongly associated with student growth. (Pascarella & Terenzini 1978, Terenzini & Pascarella 1980, Terenzini, Pascarella, and Lorang 1982.) In these studies, Pascarella and Terenzini and their colleagues developed the Classroom Involvement scale, the Faculty Relations scale, and the Faculty Concern for Student Development and Teaching scale as measures of academic integration. The classroom involvement scale is a set of items which ask students to report the extent to which they learned from and were stimulated by their classroom experiences. The Faculty Relations scale is composed of four items which ask students to report on their personal relationships with faculty, as well as faculty's influence on their intellectual, personal and career growth. The Faculty Concern scale asks students to report how interested faculty are in students and teaching. We removed one of the items from this scale and used it to develop a measure of departmental teaching climate, described above. In previous studies by Terenzini and Wright (1986), and by Volkwein, King, and Terenzini (1986), the Faculty Relations scale achieved an alpha reliability of 0.83. The Faculty Concern for Student Development and Teaching scale achieved an alpha reliability of 0.82. The Classroom Involvement scale achieved an alpha reliability of 0.73.

Student Outcomes Measures

1. **Senior Year Intellectual Growth** - an 8-item scale (Alpha = .86) which asks seniors to indicate their growth during the past year on a 4 point scale. Developed by Terenzini and his colleagues, the scale was called "academic skill development", "intellectual skill development," and "academic growth" in earlier studies (1982, 1984, 1986, & 1987).
2. **Four Year Intellectual Growth** - a 12-item scale (Alpha = .95) developed for this study from survey data collected by Terenzini and his associates at Albany. The survey asks seniors to indicate their growth over their entire college careers on a 9 point scale from no growth to extraordinary growth. The items are shown in Table 1.
3. **Four Year Growth in Disciplinary Skills** - Three items (Alpha = .88) which ask seniors to indicate their growth in understanding their disciplines' research methods, schools of thought, and relatedness to other disciplines on a 9 point scale from no growth (1) to extraordinary growth (9). (See Table 1).
4. **Senior Year Growth in Disciplinary Skills** - The same 3-item scale asking seniors to indicate their growth during the past year.
5. **Academic Satisfaction** - Three items (Alpha = .80) which ask seniors to respond on a Likert-type scale to statements about their intellectual and academic satisfaction.

TABLE 1

Student Outcomes Measures Developed for this Study from Seniors' Responses Reporting their Growth and Satisfaction at Albany

Intellectual Growth Scale (Alpha = .95)
(12 items, 9 point response scale)

	Factor Loading	Item-Total Correlation
1. Gaining factual knowledge	.61	.74
2. Developing ability to evaluate ideas critically	.76	.80
3. Developing ability to apply abstractions in solving problems	.74	.75
4. Learning fundamental principles and theories	.59	.74
5. Learning how to learn	.60	.72
6. Developing analytical thinking	.70	.81
7. Developing the ability to learn on my own	.66	.77
8. Formulating creative ideas and solutions	.65	.74
9. Gaining exposure to new intellectual areas	.52	.72
10. Synthesizing information	.53	.78
11. Recognizing general principles	.51	.74
12. Developing intellectual curiosity	.49	.75

Disciplinary Skills Scale (Alpha = .88)
(3 items, 9 point response scale)

	Factor Loading	Item-Total Correlation
1. Understanding research methods	.78	.77
2. Understanding schools of thought	.78	.83
3. Understanding disciplinary inter-relatedness	.70	.71

Academic Satisfaction (Alpha = .80)
(3 items, 5 point Likert-type scale)

	Factor Loading	Item-Total Correlation
1. I am satisfied with my academic experience at Albany this past year	.73	.64
2. I am satisfied with the extent of my intellectual development this year	.72	.67
3. My academic experience this year has had a positive influence on my intellectual growth	.75	.62

TABLE 2

MEANS, STANDARD DEVIATIONS AND RANGES FOR THE FOUR RESEARCH AND FOUR TEACHING MEASURES (N = 27 DEPARTMENTS)

DEPARTMENT VARIABLES	Mean	Standard Deviation	Range
RESEARCH			
Grant Applications per faculty	5.03	4.25	.69 to 14.16
Grants Received per faculty	3.32	3.13	.23 to 12.13
Dean's Rating	2.48	.75	(low=1, high=3)
Percent Active Scholars	61.2%	17.9%	17% to 100%
TEACHING			
Dean's Rating	2.30	.82	(low=1, high=3)
Student Rating (Likert Scale)	3.69	.47	2.5 to 5.0
Average Academic Contact			
Classroom Hours	5.98	2.35	1.2 to 12.1
Outside Classroom	12.8	9.5	6.3 to 55

RESULTS

Based on the organizational literature, we entered the study with the expectation that different academic departments would have variable research and teaching climates, and that these orientations would exhibit stability over time. These expectations are confirmed by the findings.

Table 2 shows the means, standard deviation, and ranges for each of the four measures of research and four measures of teaching. Among the research measures, the trichotomized dean's ratings tend toward the "high" category, but the other three measures exhibit a substantial spread of scores. Among the teaching measures, the trichotomized dean's ratings again lean toward the "high" category, but less so than the dean's research rating. The student ratings caused most departments to average between 3 and 4 on a 5 point scale. Average classroom contact hours, however, display a substantial spread. There appears to be enough variability in the measures to conclude that academic departments within the same institution can have substantially different orientations toward research and teaching.

In the judgement of the deans and chairs we interviewed, there was little change in departmental research and teaching climates during the 8 years between 1978 and 1986. Faculty turnover and position growth in the 27 departments during this period was low, and undergraduate student selectivity at the university also remained about the same. Similarly, the quantitative research and teaching measures also exhibit stability, with high, medium, and low scoring departments remaining about the same relative to each other, over the eight year period.

Our second important finding is that the research variables are not significantly correlated with the teaching variables, neither individually nor collectively. Table 3 shows that the correlations among the separate teaching and research measures range from -.22 to 0.17. Eleven of the correlations are negative and fourteen are positive, but none are statistically significant. The two trichotomized scales show a low-positive but statistically insignificant relationship (r=.06). This strongly suggests that teaching and research climates are relatively independent of each other, and undercuts the rhetoric in the field which views research and teaching emphases to be either negatively or positively associated.

TABLE 3

CORRELATIONS* AMONG THE MEASURES OF RESEARCH AND TEACHING
(N = 27 Departments)

DEPARTMENT TEACHING VARIABLES	DEPARTMENT RESEARCH VARIABLES				
	Number Grant Applications per faculty	Number Grants Received per faculty	Dean's Rating of Dept. Research Climate	Percent Active Scholars	Dept. Research Scale (Alpha =.90)
Dean Rating of Dept. U.G. Teaching Climate	-.11	-.03	.13	-.07	-.03
Average Student Rating of Faculty Interest in Teaching	-.22	-.05	.06	.06	-.05
Average Faculty Undergraduate Classroom Contact Hours	-.12	-.07	.03	.12	-.01
Average Faculty/Student Contact Outside Classroom	.17	.16	.16	-.01	.16
Dept. Teaching Scale (Alpha = .57)	-.09	.03	.09	.15	.06

* = None of these correlations are significant at the .05 level

TABLE 4

CORRELATIONS AMONG THE EDUCATIONAL OUTCOMES MEASURES AND THE MEASURES OF DEPARTMENTAL RESEARCH CLIMATE, DEPARTMENT TEACHING CLIMATE, AND STUDENT EXPERIENCES

	STUDENT EDUCATIONAL OUTCOMES				
	INTELLECTUAL GROWTH		DISCIPLINARY UNDERSTANDING		
	Senior Year	Four Years	Senior Year	Four Years	ACADEMIC SATISFACTION
DEPARTMENT VARIABLES					
RESEARCH CLIMATE SCALE			.07*	.12**	
Grant Applications			.09*	.11**	
Grants Received				.12**	
Dean's Rating					
% Active Scholars					
TEACHING CLIMATE SCALE					
Dean's Rating				-.09*	
Student Rating					
Average Academic Contact					
Classroom		-.10*			
Outside Classroom			.10**		
STUDENT VARIABLES					
PRE-COLLEGE					
Age					
Gender					
Parents Education					
Rank in Class					
SAT Score					
COLLEGE EXPERIENCES					
Classroom	.34**	.22**	.24**	.21**	.55**
Faculty Contact	.18**	.09*	.23**	.14**	.19**
Faculty Concern					
Faculty Relations	.22**	.13**	.26**	.13**	.29**
Peer Relations	.14**	.17**	.12**		.27**
Social Involvement		.11**	.08*		.17**
Activities				-.09*	

* = Significant at .05 level
** = Significant at .01 level

Non-significant correlations not shown

Table 4 shows the correlations between each of the five outcomes measures and the other variables in the study. The measures of departmental research and teaching climate display few significant correlations with the student growth and satisfaction variables. Student growth in disciplinary understanding has significant low positive correlations with the research climate scale, grant applications, grants received, and faculty-student contact outside the classroom.

Among the student variables, none of the pre-college characteristics are significantly correlated with the five outcomes measures. This finding is consistent with earlier studies by Terenzini and his associates which found that among the pre-college variables, only rank in class had an influence on student growth and only in the freshman year (1984, 1987).

Table 4 reveals that college experiences, especially the classroom scale, are the most strongly and consistently correlated with each of the five outcomes measures. Student classroom experiences, faculty contact outside of class, and faculty relations are significantly correlated with all five outcomes measures. The Peer Relations Scale is significantly correlated with four of the five outcomes measures. The classroom experience enjoys the highest correlations with both measures of intellectual growth, with four-year disciplinary understanding, and with academic satisfaction.

To investigate the relationships between different mixtures of departmental climate and the experiences of student majors, we used the research and teaching measures to divide the departments into high, medium, and low trichotomies for teaching and for research. Each department was classified as falling into one of five climate categories, high research/high teaching, medium research/medium teaching, high research/low teaching, low research/high teaching, and low/low. We then analyzed the student data on the three measures of academic integration, and the five outcomes shown in Table 5. In seven out of the eight columns in Table 5, the highest score was obtained by students majoring in departments rated high on both research AND teaching.

TABLE 5

MEAN SCORES ON THE ACADEMIC INTEGRATION AND OUTCOMES MEASURES
FOR STUDENTS IN EACH OF THE FIVE COMBINATIONS
OF DEPARTMENT CLIMATE
(N = 655)

TYPE OF CLIMATE	ACADEMIC INTEGRATION SCALES			OUTCOMES MEASURES				
				Intellectual Growth		Disciplinary Skills		
Research/Teaching	Classroom	Faculty Relations	Faculty Contact	Senior Year	Four Years	Senior Year	Four Years	Academic Satisfaction
High/High (N=38):	11.62***	13.42**	16.45***	24.16***	84.94*	8.42	20.84*	11.16
Medium/Med. (N=173):	11.25	12.22*	10.14*	22.04	79.11	7.61	18.41	11.35
High/Low (N=193):	10.80	11.69	9.15	22.00	78.96	8.05	19.96*	10.95
Low/High (N=73):	11.00	12.95*	8.78	21.19	75.17	7.44	17.38	11.12
Low/Low (N=178):	10.83	11.20	7.43	22.80*	81.36*	7.72	18.81	11.06

* This score is significantly higher than the lowest score in the column. ($p < .05$)
** This score is significantly higher than the two lowest scores in the column. ($p < .05$)
*** This score is significantly higher than the three lowest scores in the column. ($p < .05$)

Looking first at the three academic integration measures, the highest average score is obtained from students majoring in departments rated high/high and the lowest score is by students in low/low departments. It appears that there is a **direct relationship between these measures of department climate and student academic integration.** Turning to the five outcomes measures in Table 5, a generally similar, but weaker pattern is seen. While the differences in senior year disciplinary understanding and in academic satisfaction are not significant, it is interesting to see that the lowest average growth scores generally are from those seniors majoring in departments rated low research/high teaching, and the highest scores are attained by seniors in departments rated high on both. This pattern holds true both for their growth in the senior year and for the growth they reported for the entire four years at the university. **Students in research oriented departments on the whole reported more growth than those in teaching oriented departments.** Academic satisfaction appears about the same under these five different departmental conditions.

Taking the results in Table 5 as a whole, a combination of strong research and strong teaching climate appears to make significant contributions both to the academic integration of undergraduate majors and to their intellectual growth and disciplinary understanding. Moreover, a strong research orientation appears to promote, rather than hinder student growth. The results also suggest the presence of interaction effects between Research and Teaching orientations and this is explored more fully in Table 6.

Table 6 shows the regression beta weights using the measures of intellectual growth, disciplinary understanding, and academic satisfaction as dependent variables. Consistent with the results in Table 4, the regression analysis indicates a small role for the department variables (in every case less than 2.5% of the variance) and a stronger role for the student experience variables (especially the classroom scale).

The two intellectual growth regressions produce similar results. Research climate alone and Teaching climate alone are negatively associated with the growth measures. But the interaction effects between research and teaching produce large, positive beta weights. The classroom and peer relations scales also are significant, and account for four times as much variance as the department variables.

TABLE 6

REGRESSION BETA WEIGHTS USING THE EDUCATIONAL OUTCOMES MEASURES AS DEPENDENT VARIABLES

	STUDENT EDUCATIONAL OUTCOMES				
	INTELLECTUAL GROWTH		DISCIPLINARY UNDERSTANDING		
	Senior Year	Four Years	Senior Year	Four Years	ACADEMIC SATISFACTION
DEPARTMENT VARIABLES					
RESEARCH CLIMATE SCALE	-.50*	-.51**			
TEACHING CLIMATE SCALE	-.43***	-.44***		-.29*	
OVERALL CLIMATE (Research x Teaching)	.65**	.67**			
Step One R^2:	.019*	.020**	.008	.024**	.003
STUDENT VARIABLES					
Classroom	.29***	.21***	.15***	.18***	.44***
Faculty Contact			.11*		
Faculty Concern					
Faculty Relations	.12**		.17***		.10**
Peer Relations	.08*	.13**			.16***
Step Two R^2:	.149***	.082***	.113***	.057***	.362***
INTELLECTUAL GROWTH (Senior Year)	Na	Na	Na	Na	.13***
DISCIPLINARY UNDERSTANDING (Four Years)	Na	Na	Na	Na	.09**
Total R^2:	.168***	.102***	.121***	.081***	.391***

* = Significant at .05 level
** = Significant at .01 level
*** = Significant at .001 level

Non-significant Beta Weights not shown

The senior year disciplinary understanding regression results display an even smaller role for the department variables, suggesting that student growth in disciplinary understanding may not be an experience particular to the senior year. Regarding disciplinary understanding over the four years, only teaching climate (-.29) and classroom experiences (.18) produce significant beta weights. The student variables again account for the vast majority of the R-square.

The last column in Table 6 assumes that academic satisfaction is a final outcome or product of all the other department characteristics, student experiences, and growth measures. In this regression, the classroom (.44), faculty relations (.10), and peer relations (.16) scales account for over 36% of the satisfaction variance. Senior year intellectual growth (.13) and four year disciplinary understanding (.09) account for another 2.6% of the total variance explained.

DISCUSSION

This is the first study which attempts to measure the research and teaching climates of individual departments, and which examines the relationships between those climates and undergraduate outcomes. Among the 27 departments in this study, we found substantial variability in their separate orientations toward research and toward teaching. The research variables, while significantly correlated with each other, were not significantly correlated with the teaching variables, but their correlations with teaching were more often positive than negative. Thus, we found little evidence to support the argument in the literature that research is beneficial to teaching and learning; but we found no evidence at all supporting the opposite argument that research is harmful.

These findings regarding the relationship between department research and teaching orientations are consistent with Feldman's meta-analysis of the student ratings literature (1987). Student ratings of individual instructors generally display a positive but low correlation with faculty research and scholarly productivity, and that same low positive relationship is reflected also in the teaching and research climates of the 27 departments in this study.

The results of this investigation strongly suggest that a vigorous research orientation by an academic department, particularly when combined with attention to teaching responsibilities, has a beneficial influence on the academic integration and intellectual growth of undergraduate majors. Thus, departmental climate does play a statistically significant, though modest, role in student learning and cognitive development. Such findings lend support to the outcomes models by Pascarella (1985) and by Weidman (1979) which provide for an influence by the student's major department. While the influences of department climate were statistically significant, however, they were not nearly as influential as the individual student experiences inside and outside the classroom.

The classroom scale is the single variable which is strongly associated with all five outcomes measures. The faculty relations and peer relations scales exhibit strong influences in three of the five regressions. Thus, it appears that student learning, development, and satisfaction are most influenced by the vitality of the classroom experience, by student-faculty relationships outside the classroom, and by the strength of student friendships. This is entirely consistent with a large body of the outcomes literature (Pascarella & Terenzini, 1991).

Naturally, the findings are limited by the nature of the sample and the measures being employed. Not all institutions of higher education are research universities like the one under study; and students (even graduating seniors) do not take all their courses in the major department. Nevertheless, one's academic department is sufficiently influential in the undergraduate experience to justify its inclusion as an object of study. The measures of self-reported growth may not be as scientific as an objective pre-test post-test method, but our dependent measures have been utilized in prior studies and are regarded by the educational research community to be cost effective measures of student growth. The variety of our measures also provides diversity which guards against the weakness of relying on a single criterion.

We also are not able to control for the variable influence of different academic fields. The particular university used in this study had a range of departments which exhibited wide varieties of teaching and research orientations. This benefited our analysis. But a multicampus study might yield more statistical power, and enable researchers to control for discipline-wide influences on department climate.

By using the academic department as one unit of analysis, this investigation identifies a probable impact which research and teaching climates have on undergraduate education at a research university. Such sub-organizational influences appear to exist, but to be indirect and small in comparison to the individual experiences which students encounter and seek, both inside and outside the classroom.

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